

WHAT IS CLAIMED IS:

1. A three-dimensional ultrasonographic device,
comprising:

5 an ultrasonic transducer composed of a plurality of
piezoelectric vibrators;

a vibrator selecting part which causes an arbitrary one of
the plural piezoelectric vibrators to generate an ultrasonic wave;

10 a signal detecting circuit which selectively detects
electrical signals that the plural piezoelectric vibrators generate
when receiving echoes of the ultrasonic wave, which is generated
by the piezoelectric vibrator selected by said vibrator selecting
part to be reflected on an inspection object via an acoustic medium;

15 a signal processing part which generates three-dimensional
imaging data by aperture synthesizing from the electrical signals
detected by said signal detecting circuit, in correspondence to meshes
in a three-dimensional imaging area set in the inspection object;
and

20 a display processing part which has: a function of changing
brightness or transparency of respective meshes in the
three-dimensional area, according to values of the three-dimensional
imaging data generated by the signal processing part, that the
respective meshes have for the three-dimensional imaging data; and
a function of applying masking or image brightness correction to
25 an image of an unnecessary portion of the three-dimensional imaging
data, by multiplying the value of the three-dimensional imaging data
by a value set according to a three-dimensional coordinate position
(X, Y, Z).

2. The three-dimensional ultrasonographic device as set forth in claim 1,

wherein said display processing part comprises

a two-dimensional image generating part which sees through
5 the three-dimensional imaging data from three directions straight
to one another and projects, on a two-dimensional plane, data with
the largest value out of imaging data stacked in each of the see-through
directions out of the three-dimensional imaging data to thereby
generate three two-dimensional images in the respective three
10 directions.

3. The three-dimensional ultrasonographic device as set forth in claim 2, comprising:

an abnormality judging/displaying part which compares the
values of the three-dimensional imaging data corresponding to the
15 meshes in an area of each of the two-dimensional images generated
by said two-dimensional image generating part with a predetermined
set value to find the mesh whose value is equal to or larger than
the set value, and compares three-dimensional coordinates of the
found imaging mesh with preset three-dimensional shape information
20 on an outline shape of the inspection object or on a post-processed
portion, thereby detecting whether or not an interference between
a defect position and the post-processed portion exists in the
inspection object to display a result of the detection.

4. The three-dimensional ultrasonographic device
25 according to claim 3, comprising:

an abnormality judging/displaying part which, when the
imaging mesh whose value exceeds the predetermined set value is
selected by said two-dimensional image generating part,

automatically calculates an area of an abnormal portion based on an adjacency state of the selected imaging mesh and judges whether or not the automatically calculated area of the abnormal portion is equal to or larger than a prescribed value to display a result of the judgment.

5 5. The three-dimensional ultrasonographic device as set forth in claim 2, further comprising:

an outline drawing part which draws an outline of a shape of the inspection object so as to overlay the outline on the three two-dimensional images generated by said two-dimensional image generating part.

6. The three-dimensional ultrasonographic device as set forth in claim 1, further comprising:

an outline drawing part which draws three-dimensional shapes of an outline of the inspection object and a post-processed portion, by overlaying the three-dimensional imaging data generated by said signal processing part on the three-dimensional imaging area.

7. The three-dimensional ultrasonographic device as set forth in claim 1, further comprising:

an abnormality judging part which compares the values of the three-dimensional imaging data corresponding to the meshes in the three-dimensional imaging area with a predetermined set value to output the mesh whose value is equal to or larger than the set value, and automatically calculates a ratio of the number of the outputted meshes whose values are equal to or larger than the set value to judge that abnormality exists when an automatically calculated value becomes equal to or larger than a prescribed value.

8. The three-dimensional ultrasonographic device as set

forth in claim 1, comprising:

an abnormality judging/displaying part which compares the values of the three-dimensional imaging data corresponding to the meshes in the three-dimensional imaging area with a predetermined set value to output the mesh whose value is equal to or larger than the set value, and compares three-dimensional coordinates of the outputted mesh with preset three-dimensional shape information on an outline shape of the inspection object and on a post-processed portion, thereby detecting whether or not an interference between a defect position and the post-processed portion exists in the inspection object to display a result of the detection.

9. The three-dimensional ultrasonographic device as set forth in claim 8, comprising:

a unit which, when said abnormality judging/displaying part outputs the mesh whose value is equal to or larger than the set value from the three-dimensional imaging data, automatically calculates a volume of the abnormal portion based on an adjacency state of the outputted imaging data and judges whether or not an area of the abnormal portion is equal to or larger than a predetermined value to display a result of the judgment.

10. The three-dimensional ultrasonographic device as set forth in claim 1, comprising:

a mechanism part which mechanically drives said transducer and detects a movement position of said transducer;

an image connecting part connecting the plural imaging data that are detected each time said transducer is moved by said mechanism part; and

a display part displaying images connected by said image

connecting part.

11. The three-dimensional ultrasonographic device as set forth in claim 1, further comprising:

5 a masking part which has an aperture at a position corresponding to the inspection area and which covers a surface of the inspection object, with the aperture being set on the inspection area of the inspection object.

12. The three-dimensional ultrasonographic device as set forth in claim 1,

10 wherein the plural piezoelectric vibrators composing said ultrasonic transducer are arranged in a matrix.

13. The three-dimensional ultrasonographic device as set forth in claim 1,

15 wherein the plural piezoelectric vibrators composing said ultrasonic transducer are arranged in line.

14. The three-dimensional ultrasonographic device as set forth in claim 1,

wherein said acoustic medium is solid.

15 20 15. The three-dimensional ultrasonographic device as set forth in claim 1,

wherein said acoustic medium is liquid.

16. The three-dimensional ultrasonographic device as set forth in claim 1,

wherein the inspection object has a planar boundary.

25 17. The three-dimensional ultrasonographic device as set forth in claim 1,

wherein the inspection object has a curved boundary.

18. The three-dimensional ultrasonographic device as set

forth in claim 1,

wherein the inspection object is made of a layer having a single acoustic characteristic.

19. The three-dimensional ultrasonographic device as set
5 forth in claim 1,

wherein the inspection object is made of a layer having a plurality of acoustic characteristics.